NEPRA PacketEar

— Newsletter of the New England Packet Radio Association —

PacketEar #52 **November 1989**

JOTA, Kids, and Packet Radio

On October 21, the Wellesley Amateur Radio Society operated a two-meter packet station (W1TKZ) in support of the Boy Scout Jamboree On The Air (JOTA). It was a successful event with much interest generated by both the packet ham operators and the boys.

In a "mini Field Day" set-up, W1TKZ members and friends set up a station at the Boy Scout Camp Nobscott in Framingham, MA. Approximately forty boys and their counselors participated in the operation. We are very grateful to *you*, the packet public for taking the time to chat with the boys via the keyboard.

Here are a few personal observations from the JOTA experience that might be of use to NEPRA members interested in introducing packet radio to kids:

RAPPORT: Establish a smooth relationship with the kids. Learn their names and remember that each has his or her own individual interests. Be enthusiastic.

EXPLAINING PACKET: Use much descriptive language with comparisons to things within their range of experience. Paralleling packet radio to the telephone system is a great way to get across concepts.

Channel errors and retransmissions are a bit foreign, but are not stumbling blocks. It was quite a sight to observe eight boys watching for the STA light to go out, urging the TNC to work faster!

HANDS ON: It is not sufficient just to show kids packet, they have to *DO* it. After the initial connect, step back and let the kids take over. They respect being trusted with the equipment.

KEYBOARD DEXTERITY: Don't expect it at all. The first few messages will be slow and via the hunt-and-peck method. It does help to be patient and point out where the keys are.

COMMUNICATING: There is something about a keyboard that relaxes many kids and enables them to ragchew easier. Some boys composed group responses. That may have relieved the stress of talking with an unseen stranger at the other end.

Our experience was that the hams on the other side of the connection were very patient and excited. The kids sensed this and without the cooperation we very well might have failed.

BULLETIN BOARDS: Kids may not be very interested in reading such BBS items as ARRL bulletins or DX announcements. But they are very impressed with the capability of leaving messages for people. The familiarity of the telephone answering machine helps here.

FOLLOW THROUGH: This is the hard part. How do we groom the kids' interests in computers and radio? How do we keep it going? Schedule classes, demos, message fairs, or whatever. The important thing is to keep the ball rolling before the kids move on to some other activity.

Yes, we initially did have some reservations about JOTA. After all, we had never done anything quite like this before. Thanks to the encouragement of Jim Bond KA1ANT, we dove into it and it wasn't bad at all! So, go ahead and introduce packet radio to a group of youngsters. It really is fun!

— Vern Valero, ND1Z @ KA1RCI

November Meeting

Receiving High Resolution Digital Weather Images

Our speaker for the November meeting will be John L. DuBois, W1HDX. The subject of the talk will be "Receiving High Resolution Digital Weather Images." John will describe the equipment and the techniques needed to receive these transmissions along with lots of examples of what they look like.

John DuBois, W1HDX, has been an active ham for 35 years. He was part of the original AMSAT Phase III team and designed ground and command station equipment for these Oscars. He has been building low cost satellite digital image reception hardware for the last five years and was the first amateur worldwide to achieve reception of these images from the GOES satellite. John is CEO of Thermalogic Corporation in Waltham, a manufacturer of process control equipment. He lives in Boxborough, Mass.

John's talk will be very exciting and timely; with the Digital Fax developments in recent years, we may be looking forward to high resolution packet pictures in the not too distant future.

From the *Gateway:* The ARRL Packet Radio Newsletter

October 20, 1989

Edited by Stan Horzepa, WA1LOU

LOWER-LAYER IMPROVEMENTS DOMINATE 8th COMPUTER NETWORKING CONFERENCE

The ARRL Amateur Radio 8th Computer Networking Conference was held in Colorado Springs, Colorado, on Saturday, October 7, with approximately 150 attendees. In conjunction with the conference, the Rocky Mountain Packet Radio Association (RMPRA) held a packetfest on Sunday. The ARRL Digital Committee met that same day. If there was a theme to the conference it was the need for improvements in the lower layers of the protocol stack. New or modified level 1 and 2 packet-radio protocols were discussed in several papers, as were improvements to the radio systems in use.

A proposed broadcast protocol was presented by Gordon Beattie, N2DSY. This protocol is implemented in the BBC software package, which is part of the Radio Amateur Telecommunications Society (RATS) ROSE system. Improved performance of the AX.25 link-layer protocol was proposed in papers by Lyle Johnson, WA7GXD, Eric Gustafson, N7CL, and Detlef Schmidt, DK4EG.

On the radio front, the fast-approaching advent of high-speed packet-radio hardware (see related story entitled "Awesome I/O Card in Beta Test") brought forth much discussion of the need for coordinated network efforts, culminating in a continental high-speed network. To whet the appetites of the packeteers present, Bdale Garbee, N3EUA, displayed the 10-GHz, 1-Mbit/s packet-radio system developed with Glenn Elmore, N6GN. HF wasn't neglected either, as the HF packet-radio design quest announced in May, 1989 QST begins to bear fruit (see related stories entitled "ARRL Digital Committee Advances AX.25 V2.1, HF Project" and "Call for Participants in HF Diversity Tests").

(continues on page 4)

Secretary's Report

The October 12, 1989 meeting was opened at 7:20 PM by President Jim Morris, K1UGM. Introductions were made by all present. 24 people signed the attendance sheet.

It was decided to have the program before the business meeting in case members did not want to stay.

The speaker for the evening was Tom Yocom, WA1RTD. His subject was a description of his Information Referral Service. This is a packet radio accessed bibliography file of amateur radio articles published in Ham Radio, QST, and 73 magazines. His file is accessed via WA1PHY. For information, Tom says to send him a message @ WA1PHY with the title: HELP. A message text is unnecessary.

The Treasurer's and Secretary's reports were requested by the chair but since they were published in the *PacketEar*, reading of these was omitted.

OLD BUSINESS.

A vote was taken on the changes proposed to the Constitution at the last meeting . The changes were to Article IV, Section 1; Article V, Section 6; and Article V, Section 4. All were voted as approved and the Constitution is so amended.

It was moved and voted that NEPRA should become an ARRL affiliated club if we are eligible. Herb Salls will send in a list of members to ARRL who will establish whether we are eligible or not. The advantages of joining were enumerated as follows:

We get lists of new hams in the area. We get $2 discount from QST renewals. We get $5 discount from NEW QST subscriptions. We have access to insurance for the club. We have access to ARRL films, etc, etc. ARRL can provide speakers and/or a list of speakers.

NEW BUSINESS.

The President, K1UGM, introduced Tadd Torborg, KA2DEW, who presented information on the newly formed organization New England Digital Association (NEDA). The purpose of this organization is to set up and maintain a packet network in New England using private and club funds. No regular membership meetings are planned except for an annual meeting. The Board Directors will have more frequent meetings to decide on expenditure of club funds. There are various membership categories with dues of $10, $25, and $100 per year, each of which have various privileges.

It was moved by Herb Salls, WB1DSW, that NEPRA join the NEDA for $100. The motion was seconded. Mort Cohan, KA1IU, stated that this should be tabled until a budget is established since present expenditures for the *PacketEar* now use up the total income of the club with none left for other uses. It was voted to table this motion until next month.

It was reported that a BBS was set up at the computer show at the Bay Side Exposition Hall recently due to the efforts primarily of Eric Cottrell, WB1HBU.

KA1QML reported on attending the ARRL networking conference. He gave a brief summary of new developments including high speed Baud rates, digital voice work, digital TV, etc. There were about 200 attendies at the Colorado Springs meeting.

WB1HBU reported on his attendance at a TCP/IP meeting, noting a report that while the MicroSat launchings have been postponed, they are being rescheduled for the near future.

W1EO reported WA1PHY is working on a RLI-TCP/IP message gateway station.

KB1PA reported that there is an active group in the Boston Computer Society publicizing amateur radio and digital communication. They are planning a hands-on session for those interested. They plan a table at the NE Computer Show.

The meeting was adjourned at 9:55 PM.

— Respectfully submitted,
Lew Scott, Secretary

November Treasurer's Report

The Club's Treasury had a fairly good month with 12 dues payments received. There were four new members during the month and eight renewals. Expenditures reached $102 for the month from basic printing charges. I am looking into having some small advertising from local ham stores placed into the newsletter so that it becomes a more self-sufficient activity. Also, the possibility exists that sales firms of more national notoriety could be convinced to try some advertisement. Our closing balance for the month stands at $1190.38.

Also, in October we submitted our application to ARRL HQ asking for League Affiliation. From a monetary standpoint this is a good thing in that Club members can receive QST magazine for a couple of dollars less than the normal price if they subscribe through NEPRA. While we haven't yet received a determination from the League, should it arrive please watch the *PacketEar* for more announcements regarding this additional "benefit."

Again, I'd remind everyone that a little salesmanship can go a long way. If one or several friends could benefit from joining our organization please have them get in touch with us and we'll gladly mail them an application. We'd love the chance to have them join.

The address is: NEPRA, Box 208, East Kingston, NH 03827.

— Respectfully Submitted,
Herb Salls, WB1DSW, NEPRA Treasurer

New England Packet Radio Association Budget Submission for FY 1990 October 19, 1989

The Club continues to produce nominal amounts of income. Over the past two years our average monthly balance, considering a few large expenditures is roughly $1100. To enable better planning and to allow us to focus on new issues and projects, our budget forecast is submitted for membership perusal and comment.

RECURRING EXPENDITURES (Projected):	
Monthly Newsletter Printing	$ 100.00
Monthly Postage for Newsletter	40.00
Total (per month)	$ 140.00
Total (annual)	$1680.00
INCOME (Projected):	
Monthly Dues Renewals/ New Members	$ 150.00
Total (per month)	$ 150.00
Total (annual)	$1800.00

The above shows that considered on an even scale, the Club will realize a net gain over the year of $120.00. The effects of major purchases has not been factored in. The effects of a wide area membership campaign have not been added in to income. We assume that most of our current 125 paid members will renew sometime during the year netting us some $1875 in projected revenues given the assumption. Thus, in planning for the year's activities it should be kept in mind that any major purchase should be accompanied by an attendant membership campaign to offset the negative effects on the Club treasury. On the other hand, it may be argued that the Club treasury itself is too large and that these monies should be used for some target purpose rather than sit in a non-interest bearing checking account.

With respect to that issue, the Treasurer decided on a such an account because most banks, when the balance falls below $1000 minimum, begin service charging and fee per check charges. The Treasurer is constantly on the alert in searching for lower balance minimum accounts — so far none has been seen. Then, too, starting a new account incurs an expense for new checks, etc. The Club treasury is located at the First New Hampshire Banks in Manchester, NH for convenience sake.

Happy Thanksgiving

NEPRA Officers and Staff

President .....Jim Morris, K1UGM 617-245-2897
Vice President .....Mort Cohan, KA1IU
Technical VP .....Doc Willard, W1EO
Secretary .....Lew Scott, W1CE
Treasurer .....Herb Salls, WB1DSW
Member-at-Large .....Dave Crocker, W1TMO
and *PacketEar* Publisher 617-444-7724

Please send editorial contributions to:

W1TMO @ N1BGG

or to *NEPRA PacketEar*
c/o David C. Crocker, W1TMO
80 Spring Road, Needham, MA 02194
Tel: 617-444-7020 — Fax: 617-444-8316

DEADLINE for the *PacketEar* is the Saturday of the second weekend before the scheduled NEPRA meeting.

The Weekly Packet Net meets on Friday @ 8:00 pm on the 146.625 (-600) Haverhill machine.

Continuation of an article started in the October issue

MORE ON FASTER NETWORKS

by Jim Morris, K1UGM

Continuing with my extractions from the following presentation at the 6th ARRL Computer Networking Conference, August 1987

Performance Monitoring
- or -
"I wanna fix it, is it broke?"

by Skip Hansen, WB6YMH
and Harold Price, NK6K

. . .

Unfortunately, we'll never know. Since there was no network performance data before the change, and none was taken after, there is no way to tell. Our only indication is indirect; one of the original major proponents of the change to poll/final is now suggesting that poll/final not be used in some cases. [1]

For future changes, we must do better.

1.2 NET/ROM

In California, the old digipeater backbone which connected northern California, southern California, and Arizona has been largely supplanted by NET/ROM nodes. We had no data showing the performance of the old system, and we have no data on the performance of the new system. It is therefore difficult to measure the improvement.

2. The Current State of Affairs.

There appears to be only one kind of monitoring being done in amateur packet radio today. The two most common BBS systems, by WORLI and by WA7MBL, both produce a log of BBS activities. An analysis program produces a report for the BBS operator of the number of connects from users and the number of messages forwarded, among other items. While this gives a BBS operator some idea of his local usage patterns, it does little to describe total network activity, or even the throughput the BBS experiences.

—For global network performance we are left with anecdotal evidence, e.g., "01 really stinks tonight" (translation: performance is less than expected), and "I had no problem with 01 today" (translation: I'm retired and was on at 10:00am).

—For local user performance, we get "I can talk to Utah all night long", and "I haven't been able to connect up north all week" Obviously, we need something better.

3. It's not easy

There are two ways of looking at network performance, one is from the network's point of view, the other is from the user's point of view. In the first case we are interested in how the channel is performing, in the simplest view, how many bytes of data it is carrying. Is the network carrying a large number of user bytes, or is most of the capacity going to overhead or retries? Are we losing data to collisions, or to bad RF paths?

In the second case, the user's point of view, the questions are more toward what level of service an individual user is getting from the network. Is the response time from distant locations adequate? Do many connections time-out? Are some destinations unreachable due to congestions or path failures?

There are several ways of acquiring performance data. One is to have each user station collect it. As updating 40,000 user's is a non-trivial exercise, we've chosen another route. A specialized monitor station sits at a central place and looks at all the activity on the channel. Unfortunately, it isn't easy to answer any of the questions from a third-party monitor station. Some of the problems are discussed below.

3.1 The problem is, it's Radio.

In most wire-based, broadcast-type LANs, a monitor program can make the assumption that if it heard a packet, everyone else in the LAN heard the packet. More importantly, if it didn't hear a packet, no one else did either. Even if the LAN is relaying data between two other LANs, it is at least certain that for data originated on the LAN or destined for the LAN, the monitor has a high probability of having seen the same data as the other stations on the LAN. In the amateur packet network, due to hidden terminals, the FM capture effect, and propagation, all stations do not hear the same packets.

If the monitor station heard all packets, it could easily follow the state of all connections on the LAN. For connection-oriented protocols like AX.25 and TCP, and providing the monitor has been up as long as the other stations on the LAN, the monitor can tell how long a connection has been in place based on the circuit start and end protocols. In the amateur radio case, the monitor station can not be certain that it heard all packets. It may miss a circuit startup or end. It must instead be prepared to infer that a connection exists because it sees data flowing, or that a circuit has closed because it has seen no data for an interval of time. This will add uncertainty to data gathered in an RF environment but it does not invalidate the entire effort.

Although collisions can be directly detected on a wire LAN, they can not be as easily detected on radio. Due to the capture effect, a stronger FM station will completely override a weaker station such that the stronger packet is received without error, even though two packets were being transmitted at the same time. A collision may be inferred if the received packet is seen again.

Some tasks then become exercises in gathering as much information as possible, and then making an educated guess. Still, this is better than no data at all.

3.2 Users are Easy to Replace.

It is somewhat easier to gather user-oriented data, e.g., does a path to station X exist at this time, or what is the round-trip delay for packets between Los Angeles and Salt Lake City. The monitor station can actually be a user and directly measure these values.

While data can be gathered about the performance of the channel at a specific time in this way, this alone will not supply information about the global network status at the time the measurement was taken. To be able to draw a meaningful conclusion from the data, aside from variable X was equal to Y at time T, other information is needed, such as the number of transmitters on the air, and the number of other packets on the channel. In short, both types of monitoring must be performed, direct measurement of user performance and global network measurement.

4. Monitoring Software

The software currently under development by the authors addresses the problem of global network monitoring. Other types of monitoring will be added in the future.

In this early version of the software, we are attempting to determine what sorts of questions can be answered by a program which listens to a channel and takes note of the packets it hears. Some questions, such has how many total bytes are being received at the monitor site, how many transmitters are seen, how many beacons are heard, are easy to answer.

A much more difficult question is "How many times does the average forwarding BBS send a 20k file before it goes all the way without timing out?" The type of information we're collecting, and the type of questions that can be answered, are discussed below.

(K1UGM note: *A section of text has been deleted at this point in order to condense the article for publication in our newsletter. The missing text is available from the source given below or on request with an SASE to K1UGM including a disk formatted for an IBM XT or AT.*)

7. Conclusion

There is much good to be gained from gathering and analyzing performance data. It can tell us where we are and suggest where we might go. It will also help determine if we like where we've gone once we get there. The work discussed here is a start toward developing tools to aid in this task. Others are invited to participate.

8. Availability

The software described in this paper is available in source form from the WB6YMH-2 BBS on 145.36 in southern California. This BBS is also accessible by phone for those not in the local area at (213) 541-2503. Updates will be sent periodically to the HAMNET BBS on Compuserve.

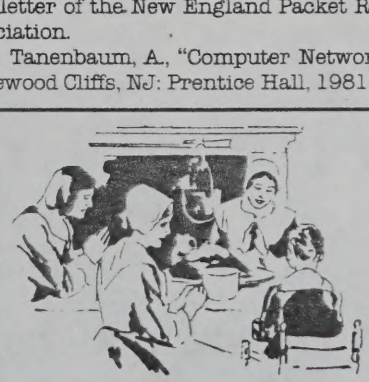
9. Acknowledgments

Thanks to Craig Robins, WB6FVC, for his help in the preparation of this paper. Thanks also to those who have implemented the KISS code for the TNC 1 and TNC 2, and the folks at AEA.

10. References.

[1] Karn, P., KA9Q, "Proposed Changes to AX.25 Level 2," informal paper circulated on various mail systems and reprinted in the July/August 1987 NEPRA *PacketEar*, the newsletter of the New England Packet Radio Association.

[2] Tanenbaum, A., "Computer Networks," Englewood Cliffs, NJ: Prentice Hall, 1981.



Gateway (continued from page 1)

ARRL DIGITAL COMMITTEE ADVANCES HF PROJECT, AX.25 V2.1

At its meeting on October 8, the ARRL Digital Committee discussed the potential for vast improvement of HF packet radio. They defined four specific areas to improve: modem design, protocols, use of diversity techniques, and network management. Each of these areas will be addressed with ARRL support as needed by issuance of grants to developers. (See "The Great 1989 HF Packet Design Quest" in May, 1989 QST.)

The proposed update of the AX.25 protocol to V2.1, reported in the October 21, 1988 issue of Gateway, was adopted by the Digital Committee. The final draft of the new protocol specification is being put together by Eric Scace, K3NA, and Terry Fox, WB4JFI, and will be reviewed by the Committee prior to publication. The changes made to AX.25 should not affect interoperability with existing V2.0 implementations. The Committee would like to thank all those who commented on the proposal for their contributions to the final version.

CALL FOR PARTICIPANTS IN HF DIVERSITY TESTS

One of the techniques that shows great promise or improved HF packet-radio performance is diversity reception. Used for years by military and commercial stations, diversity is the technique of receiving the same signal on two different antennas. The antennas may be separated in space, different in polarization or use different angles of arrival for the received signal. Steve Hall, WM6P, has been testing some of these techniques and reported encouraging results at the 8th Computer Networking Conference. Steve has agreed to organize a group to work in this area to find usable approaches for HF packet radio. If you are interested in assisting in this effort in any way, contact Steve via mail or packet radio at:

Steve Hall, WM6P @ N6BGW
664 Bristol Av
Simi Valley, CA 93065

AWESOME I/O CARD IN BETA TEST

At last year's Computer Networking Conference, Mike Chepponis, K3MC, presented a design for the "Totally Awesome I/O card." (Mike lives in California now... or couldn't you tell?) Since then, the Awesome I/O Card, as it's known for short has been under development at Digital Radio Systems, Inc (DRSI), in Clearwater, Florida. DRSI founder Andy DeMartini, KC2FF, brought copies of the "Product News Brief," dated October 7, to the Conference.

The improved Awesome I/O Card consists of a NEC V40 CPU running at 8 MHz, two 1-Mbit/s I/O ports with direct memory access (DMA), up to eight 19.2-kbit/s ports and as much as 512 kbytes of dynamic RAM and 128 kbytes of EPROM. The card plugs into an IBM PC/XT/AT or acts as a standalone controller.

Software will include an EPROM version of TCP/IP. Other packet-radio networking providers are orking on versions for the Awesome I/O card too. For more information, contact DRSI at:

DRSI
2065 Range Rd
Clearwater, FL 34625
telephone 813-461-0204

(Gateway extends special thanks to Jon Bloom, KE3Z, who provided the preceding reports from the Conference.)

These are but a few of the excellent articles appearing in GATEWAY. For more information or to subscribe, contact ARRL.

BEGINNER'S WEEKLY PACKET NET

For those of you living in the Route 128 area of Massachusetts, we would like to invite you to participate in the Beginner's Weekly Packet Net. The BWPN offers a chance for you to ask questions and obtain answers in a voice net with many other amateurs interested in learning more about packet opertaions. We cover just about everything from TNC hookup advice, to computer problem solving, to software explanations to node and linking information... you name it! From time to time, we have guest speakers who join us and cover their particular interest in depth. We try to have at least a focus or topic of the evening, delving into some relevant aspect of packet activity. And, of course, we give you the opportunity to spend some time talking about what interests you.

The Beginner's Weekly Packet Net is held each Friday evening at 8:00 PM on the Haverhill MA repeater with a frequency of 146.625 (tx -600Khz) and is sponsored with the complete cooperation of the Pentucket Radio Association. Look for WB1DSW as NCS and do check in with us. We'd like hearing from you...

NEPRA PacketEar

New England Packet Radio Association
P.O. Box 208
East Kingston, NH 03827

MEMBERSHIP in NEPRA is open to all amateurs with an interest in packet radio. Annual dues are $15. The expiration date for current members is given on your mailing label. If the date has been circled in red, the expiration date is imminent. The address for new memberships or renewals is given above.

NEPRA MEETINGS are held at the Bull (fomer Honeywell) plant cafeteria in Billerica at 7:30 PM on the Second Thursday of each month. Take Route 3 to exit 27, Concord Road. Proceed West a couple of hundred yards and you will see a sign and entrance to Bull on the left. Parking and entrance are at the rear of the building. New Users Session @ 7:00 pm. General Meeting @ 8:00 pm. Talk-in is available on 147.12 MHz.

NEXT MEETING — NOVEMBER 9!

FIRST CLASS M